Remarks

Applicant respectfully requests favorable reconsideration of this Response and Amendment, as well as consideration of the pending claims as amended herein. The Examiner is encouraged to contact the undersigned by telephone to facilitate any remaining questions or issues.

Applicant received the Examiner's communication dated 08/15/06 confirming review by the Examiner of Applicant's 09/13/04 IDS.

Applicant would like to respectfully present to the Examiner that US 3459953 (Hughes, et al.) is not listed on the Examiner's Notice of References Cited; regardless, Applicant has located a copy of Hughes et al. at the USPTO website for incorporation in this Office Action Response.

Status of Pending Claims:

Claims 216-220, 222-254, 256, 258-260, and 342 are pending in this application.

Claim 256 and 258 are (Currently amended).

Claims 216, 218-219, 222, 224, 227-231, 233-234, 236-237, 239-244, 247-250, 252, 259-260 and 342 are (Previously presented).

Claims 217, 220, 223, 225, 226, 232, 235, 238, 245-246, 251, and 253-254 are (Original).

Claim 343 is (New).

Claims 1-215, 221, 255, 257 are (Canceled).

Claims 261-341 are (Withdrawn).

Amendments to the Claims:

Clarifying amendments have been made to claims.

Summary of Examiner's Claim Rejections:

Claims 216-220, 222, 224, 328-240, 243, 248-254, 256, 258, 342, are rejected under 35 U.S.C. 102(b) as being anticipated by US 4841731 (Tindell). Claims 216-220, 222, 224, 328-240, 243, 248-254, 256, 258, 342, are rejected under 35 U.S.C. 102(b) as being anticipated by US 3459953 (Hughes). Claim 223 is rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. 4841731 (Tindell) in view of U.S. 5388395 (Scharpf et al). Claims 225-227 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. 4841731 (Tindell) in view of U.S. 5899072 (Gode). Claims 230-236 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. 4841731 (Tindell) in view of U.S. 5516359 (Kang et al). Claim 237 is rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. 4841731 (Tindell) in view of U.S. 4440545 (Weidig). Claim 241 is rejected under 35 U.S.C. § 103(a) as being unpatentable

over U.S. 4841731 (Tindell) in view of U.S. 3975913 (Erickson). Claims 242, 259-260, are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. 4841731 (Tindell). Claims 244-247 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. 4841731 (Tindell) in view of U.S. 6698183 (Thordarson).

Marked-up Set of Claims (According to 37 CFR 1.121(c))

Claims 1 – 215 (Canceled)

216. (Previously Presented) An engine comprising a fuel mixture of oxygen, as O_2, and hydrogen, as H_2, wherein

said oxygen and hydrogen are combusted in a combustion chamber, and wherein

the temperature of said combustion or of said combustion chamber is at least partially controlled with the addition of water to said combustion chamber.

217. (Original) The engine of claim 216, wherein mechanical rotating energy is created.

218. (Previously Presented) The engine of claim 217, wherein said rotating mechanical energy turns a generator to create electrical energy.

219. (Previously Presented) The engine of claim 216, wherein the steam produced by combustion turns a steam turbine, and wherein

said steam turbine turns a generator to create electrical energy.

220. (Original) The engine of claim 216, wherein heat is created.

221. (Canceled)

222. (Previously Presented) The engine of claim 218 or 219, wherein at least a portion of said electrical energy is used in the electrolysis of water to hydrogen and oxygen, and wherein

at least a portion of at least one of said hydrogen and oxygen is used in said engine.

223. (Original) The engine of claim 216, wherein nitrogen or argon is in said fuel mixture.

224. (Previously Presented) The engine of claim 216, wherein said oxygen further comprises air.

225. (Original) The engine of claim 216, wherein at least a portion of the steam produced by combustion is converted to hydrogen by the corrosion of at least one metal.

226. (Original) The engine of claim 225, wherein the conversion of said steam into said hydrogen is increased by an electrical current in said metal(s).

227. (Previously Presented) The engine of claim 225 or 226, wherein said hydrogen is at least partially used as fuel in said engine.

228. (Previously Presented) The engine of claim 216, wherein a generator turns due to the movement of air or water, and wherein

said generator creates electrical energy, and wherein

said electrical energy is at least partially utilized in the electrolysis of water to hydrogen and oxygen, and wherein

at least a portion of at least one of said hydrogen and oxygen is used ~~as fuel~~ in said engine.

229. (Previously Presented) The engine of claim 216, wherein a photovoltaic cell creates electrical energy, and wherein

said electrical energy is at least partially used in the electrolysis of water to hydrogen and oxygen, and wherein

at least a portion of at least one of said hydrogen and oxygen is used in said engine.

230. (Previously Presented) The engine of claim 216, further comprising a cryogenic air separation unit, wherein

at least a portion of the energy of combustion powers at least a portion of said cryogenic air separation unit.

231. (Previously Presented) The engine of claim 230, wherein at least a portion of the nitrogen separated from air in said cryogenic air separation unit is used to cool any portion of at least one selected from a list consisting of: said cryogenic air separation unit, the storage of oxygen, the storage of hydrogen, electrolysis, coolant for said engine, said engine and any combination thereof.

232. (Original) The engine of claim 230, wherein the nitrogen separated from air in said cryogenic air separation unit is at least partially used to cool air or water.

233. (Previously Presented) The engine of claim 216, further comprising a membrane air separation unit, wherein

at least a portion of the energy of combustion powers at least a portion of said membrane air separation unit.

234. (Previously Presented) The engine of claim 216, further comprising a PSA air separation unit, wherein

at least a portion of the energy of combustion powers at least a portion of said PSA air separation unit.

235. (Original) The engine of claim 230, 233 or 234, wherein the oxygen separated from air is at least one of enriched oxygen, pure oxygen and very pure oxygen.

236. (Previously Presented) The engine of claim 230, 233 or 234, wherein at least a portion the oxygen separated from air is used in said engine.

237. (Previously Presented) The engine of claim 216, wherein at least one selected from a list consisting of a: corrosion inhibitor, chelant, dispersant and any combination therein is added to at least a portion of the water in said engine.

238. (Original) The engine of claim 216, wherein said engine performs at least one of: internal, turbine and heating combustion.

239. (Previously Presented) The engine of claim 216, wherein at least one of oxygen and hydrogen is stored in at least one of a cooled gas state and a liquid state by liquefaction.

240. (Previously Presented) The engine of claim 239, wherein compressor(s) for at least one of cooling and liquefaction is powered by at least one of said engine and a fuel cell.

241. (Previously Presented) The engine of claim 240, wherein said fuel cell is powered by hydrogen and at least one of oxygen and air.

242. (Previously Presented) The engine of claim 216, wherein at least one of said hydrogen and oxygen is stored in a mixture with frozen water crystals to form a gel.

243. (Previously Presented) The engine of claim 216, wherein at least one selected form a list consisting of: hydrogen, oxygen and water are preheated prior to combustion with the energy from at least one selected from a list consisting of: ambient temperature, said engine, said engine exhaust, an electrical radiant heat source and any combination therein.

244. (Previously Presented) The engine of claim 217, wherein said mechanical rotating energy from said engine enters a transmission, wherein

said transmission engage in a manner that is inversely proportional to at least one of the torque and work output of said engine, and wherein

said transmission output mechanical rotating energy turn a generator to create electrical energy.

245. (Original) The engine of claim 244, wherein said transmission engage a flywheel capable of storing rotational kinetic energy, wherein

said flywheel turns said generator.

246. (Original) The engine of claim 244, wherein at least a portion of said electrical energy is used in the electrolysis of water to hydrogen and oxygen.

247. (Previously Presented) The engine of claim 246, wherein at least one of said hydrogen and oxygen is used in said engine.

248. (Previously Presented) The engine of claim 216 or 219, wherein a pressure control device is in said engine exhaust.

249. (Previously Presented) The engine of claim 216, wherein at least one of said engine combustion heat energy and said engine exhaust energy is used to heat at least one of a gas and a liquid.

250. (Previously Presented) The engine of claim 249, wherein at least one of the gas is air and the liquid is water.

251. (Original) The engine of claim 250, wherein said exhaust discharge directly into said air or water.

252. (Previously Presented) The engine of claim 216 or 230, wherein at least a portion of said engine is insulated.

253. (Original) The engine of claim 230, wherein hydrogen is separated.

254. (Original) The engine of claim 216, wherein said oxygen is at least one of: enriched oxygen, pure oxygen and very pure oxygen.

255. (Canceled)

256. (Currently amended) The engine of claim 216, wherein the temperature of at least one of the combustion chamber and of combustion is at least partially controlled with air to combustion in excess over that required to perform combustion in a way that maintains combustion or combustion exhaust temperature.

257. (Canceled)

258. (Currently amended) The engine of claim 216, wherein the temperature of said engine exhaust is at least partially cooled with the addition of water to said engine exhaust.

259. (Previously Presented) The engine of claim 256 or 258, comprising jet propulsion.

260. (Previously Presented) The engine of claim 216, 254, 256 or 258, comprising rocket propulsion.

Claims 261 - 341 (Withdrawn)

342. (Previously Presented) The engine of claim 230, 233 or 234, wherein said engine comprises a turbine.

343. (New) The engine of claim 256, comprising jet propulsion wherein said air is stoichiometrically increased in the jet intake for hydrogen thermodynamics and/or to operate with excess air for cooling.

Examiner Objections and Rejections

Examiner Rejection

Claims 216-220, 222, 224, 238-240, 243, 248-254, 256, 258, 342, are rejected under 35 U.S.C. 102(b) as being anticipated by US 4841731 (Tindell).

Tindell discloses a solar energy system comprising an electrolysis chamber **13** for forming hydrogen being stored in a hydrogen tank **22**, oxygen being stored in an oxygen tank **21**, a combustion chamber **33** for burning said hydrogen and oxygen, water input nozzle **31** for injecting water into the combustion chamber, said combustion chamber is then acting as a steam generator to generate steam to drive a steam turbine **47** to generate electricity through a generator **48**.

In response, Applicant would like to present to the Examiner that Tindell presents a solar powered system. Specifically, in the abstract Tindell states:

> "A solar-powered system for supplying large quantitites of usable power consists of an array of photo-voltaic cells which drive an electrolysis generator in which water is converted into oxygen and hydrogen gases."

Further, in the "Field of the Invention" Tindell States:

> "This invention relates to a process and apparatus for harnessing the sun's energy to provide a primary power source for supplying large quantities of usable power and, as a by product, distilled water for domestic use."

And further, in "Description of the Preferred Embodiment" Tindell states:

> "As shown in the drawing, an electrical energy production means **10** comprises an array **11** of solar actuated voltaic cells **12** is arranged to receive incident radiation from the sun. The cells **12** are preferably the thin film, amorphous silicon alloy parts, voltaic cells produced by SOVONIC Solar Systems, or equivalent cells produced by Sony Corporation. The construction and operation of these cells are well known in the art and are not a part of this invention. The solar cell array when subject to solar radiation produces DC electric current in a manner well known to those skilled in the art."

In contrast to Tindell, within the instant invention, independent claim 216 states:

> "216. An engine comprising a fuel mixture of oxygen, as O_2, and hydrogen, as H_2, wherein
> said oxygen and hydrogen are combusted in a combustion chamber, and wherein
> the temperature of said combustion or of said combustion chamber is at least partially controlled with the addition of water to said combustion chamber."

Therefore, as there is no requirement within independent claim 216 for: solar energy, the inclusion of a voltaic cell, or a steam electrical generator, independent claim 216 is patentably distinguishable over Tindell (MPEP 716.02 (b)). Further, Tindell requires the pressurized storage of hydrogen and oxygen, wherein Applicant has no such requirement in any of said claims.

As applicant has respectfully traversed the Examiner's U.S.C. 102(b) rejection of independent claim 216, Applicant respectfully requests an allowance of dependent claims 217-220, 222, 224, 228-229, 238-240, 243, 248-254, 256, 258 and 342, as said claims are dependant upon base claim 216, which is allowable.

Examiner Rejection

Claims 216-220, 222, 224, 228-229, 238-240, 243, 248-254, 256, 258, 342, are rejected under 35 U.S.C. 102(b) as being anticipated by US 3459953 (Hughes et al).

Hughes et al discloses a solar energy system comprising an electrolysis chamber **16** for forming hydrogen being stored in an hydrogen tank **20**, oxygen being stored in an oxygen tank **22**, a combustion chamber **24** for burning said hydrogen and oxygen, water input nozzle **48** for injecting water into the combustion chamber, said combustion chamber is then acting as a steam generator to generate steam to drive a steam turbine **32** to generate electricity through a generator **36**. Note the electrical input **10** can be from any source (column 2, lines 15-16), so it's clear that the electricity from the generator **36** can be used too.

In response, Applicant would like to present to the Examiner that Hughes et al. presents an energy storage system. Specifically, in the abstract Hughes et al state:

> "This invention provides a system for storing surplus electrical energy and for generating electrical energy from such stored surplus as conditions require."

And further, in "Description of the Preferred Embodiment" Hughes et al. state:

> "Surplus electrical energy from any electrical source is fed to the system at energy input points **10**, and by way of conductors **12** to electrodes **14** to a water containing electrolysis unit **16**. Hydrogen and oxygen are released through the electrolysis process in unit **16** and carried out by pipes **18**. Hydrogen is stored in a high pressure storage container **20** and oxygen is stored the high pressure storage container **22**. The hydrogen and oxygen is stored at high pressures in order to concentrate the stored energy in a reasonable space requirement; therefore, the hydrogen and oxygen may be compressed by after these gases leave the electrolysis unit or the electrolysis unit may operate at high pressure so that no compression system is required between the unit and the storage chamber...
>
> "To recover the energy stored in the form of hydrogen and oxygen in chambers **20** and **22** gases therefrom are conveyed to an aphodid burner."

In contrast to Hughes et al., within the instant invention, independent claim 216 states:

> "216. An engine comprising a fuel mixture of oxygen, as O_2, and hydrogen, as H_2, wherein
> said oxygen and hydrogen are combusted in a combustion chamber, and wherein
> the temperature of said combustion or of said combustion chamber is at least partially controlled with the addition of water to said combustion chamber."

Therefore, as there is no requirement within independent claim 216 for either an: electrical energy source, energy storage system or electrolysis unit, independent claim 216 is patentably distinguishable over Hughes et al. (MPEP 716.02 (b)). Further, Applicant has no hydrogen or oxygen pressurized storage requirement in any of said claims. Further still, Applicant has no requirement for a surplus electricity source in any of said claims.

As applicant has respectfully traversed the Examiner's U.S.C. 102 Rejection of independent claim 216, Applicant respectfully requests an allowance of dependent claims 217-220, 222, 224, 228-229, 238-240, 243, 248-254, 256, 258 and 342, as said claims are dependant upon base claim 216, which is allowable.

Examiner Rejection

Claim 223 is rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. 4841731 (Tindell) in view of U.S. 5388395 (Scharpf et al). Tindell discloses all the claimed subject matter as set forth above, but does not disclose the use of nitrogen. Scharpf et al is relied upon to disclose its well known to use nitrogen in the inlet of the combustion chamber for the purpose of improving the cooling function of the input fluid. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to inject nitrogen in Tindell as taught by Scharpf et al for the purpose of improving the cooling function of the input fluid.

In response, Applicant would like to present to the Examiner, as presented above, that Tindell requires the use of solar energy, a voltaic cell and a steam generator, neither of which is required by claim 216 or by claim 223. In addition, Applicant would like to present to the Examiner that Scharpf et al. describe the use of cryogenic nitrogen from a cryogenic air separation unit. Specifically, in the Abstract Scharpf states:

> "The present invention is an improvement to a process for the production of work to generate electricity or to drive a mechanical device using a gas turbine. In the process, feed air stream is compressed and combusted with a fuel gas to produce a combustion product. This combustion product is expanded in a gas turbine expander, thereby producing a hot exhaust gas and work. This produced work is used to generate electricity or to drive a mechanical device. The improvement to the process, which increases the work produced by the gas

> turbine expander, is characterized by **cooling nitrogen product, produced by a cryogenic air separation unit to a subambient temperature and combining this subambient cooled, nitrogen product with the feed air stream prior to compression.** (Emphasis added)

Further, in "Detailed Description of the Invention", Scharpf et al. state:

> The present invention is an improvement to a process for the production of work using a gas turbine either in a simple or a combined cycle configuration. The improvement is particularly suited to the process, wherein at least a portion of the oxygen product produced by the cryogenic air separation unit is reacted with a carbonaceous feedstock in a gasification unit to produce the fuel gas, which is rich in carbon monoxide and hydrogen. The carbonaceous feedstock reacted in the gasifier unit can be coal, petroleum coke, tar sands bitumen, tar sand emulsion, municipal wastes, petroleum residua, waste oil or mixtures thereof.

Therefore, Scharpf et al. teach the use of nitrogen obtained from the cryogenic distillation of air along with the use of said nitrogen at a subambient temperature to cool the combustion of a carbonaceous feedstock such as coal, petroleum coke, tar sands bitumen, tar sand emulsion, municipal wastes, petroleum residua, waste oil or mixtures thereof. Applicant would like to respectfully present to the Examiner that there is no requirement within claim 223 or within claim 216, from which claim 223 depends, for a carbonaceous feedstock or nitrogen at subambient temperature.

Applicant obtained an electronic version of Scharpf et al. from uspto.gov and performed a word search within Tindell for the word "hydrogen"; hydrogen only occurs within Scharpf et al. as a component within said carbonaceous fuel. Applicant then also obtained an electronic version of Tindell at uspto.gov and performed a word search for the word "nitrogen"; nitrogen does not occur within Tindell, nor do the words cooling, subambient nitrogen or cryogenic.

In conclusion, Scharpf et al. does not teach or suggest the combustion of hydrogen, while Tindell does not teach or suggest the use of nitrogen, subambient nitrogen or of cryogenics; therefore, there is no motivation between Scharpf et al. or Tindell to combine with the other, e.g. MPEP 706.02(j). This is while both Tindell and Scharpf et al. have teachings and/or requirements which are not found within the instant claim, e.g. cryogenics, subambient nitrogen, solar and voltaics.

As Applicant has respectfully traversed the Examiner's rejection of claim 223, Applicant respectfully requests an allowance of claim 223.

Examiner Rejection

Claims 225-227 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. 4841731 (Tindell) in view of U.S. 5899072 (Gode). Tindell discloses all the claimed subject

matter as set forth above, but does not disclose the use of corrosion to form hydrogen. Gode is relied upon to disclose it's well known to use corrosion to form hydrogen (column 1, lines 36-49). It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form hydrogen by corrosion in Tindell as taught by Gode for the purpose of generating more hydrogen if needed.

In response, Applicant would like to respectfully present to the Examiner that: claims 225-227 depend upon claim 216. As Applicant has respectfully traversed the Examiner's rejection of claim 216, Applicant has respectfully traversed the Examiner's rejections of claims 225 – 227 by traversing the base claim upon which claims 225 – 227 depend. Accordingly, Applicant respectfully requests an allowance of claims 225 – 227 as amended herein according to MPEP 2143.03.

Examiner Rejection

Claims 230-236 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. 4841731 (Tindell) in view of U.S. 5516359 (Kang et al). Tindell discloses all the claimed subject matter as set forth above, but does not disclose the use of an air separation unit with a membrane. Kang et al is relied upon to disclose it's well known to use air separation unit 107 with membrane 108 for separating air. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to use an air separation unit with membrane in Tindell as taught by Kang et al fro the purpose of separating air to form more important components if needed.

In response, Applicant would like to present to the Examiner, as presented above, that Tindell requires the use of solar energy, a voltaic cell and a steam generator, neither of which is required by claims 230 - 236. In addition, Applicant would like to present to the Examiner that Kang et al. teaches both the combustion of a hydrocarbon fuel and the required membrane separation of air at high temperature, when none of these restrictions are presented within the instant invention or required within instant claims 230 - 236. Specifically, in the abstract Kang et al. state:

> "Oxygen is separated from air by a high temperature ion transport membrane which is integrated with a gas turbine system for energy recovery from the membrane nonpermeate stream. **Air is compressed, heated in a first heating step**, and passed through the feed side of a mixed conductor membrane zone to produce a high purity oxygen product on the permeate side of the membrane zone. Nonpermeate gas from the membrane zone is **heated** in a second heating step and passed through a hot gas turbine for power recovery. The operating temperatures of the membrane zone and the expansion turbine are independently maintained by controlling the rate of **heat addition** in the first and second heating steps,

whereby the membrane zone and expansion turbine are thermally delinked for maximum oxygen recovery efficiency." (Emphasis added)

Also, in the "Detailed Description of the Invention" Kang et al. state:

"The present invention comprises several embodiments of a process to recover oxygen from an oxygen-containing gas mixture, preferably air, **at high temperature utilizing a mixed conductor membrane which is heat integrated with a hot gas expansion turbine to maximize the efficiency of energy use in recovering oxygen with the alternate coproducts steam and electricity. The key feature of all embodiments of the invention as described herein is the thermal decoupling of the mixed conductor membrane and the hot gas turbine, which means that each is operated at a temperature which allows the most efficient operation of the combined system.** This is achieved by controlled firing of direct-fired combustors as described in the following specification.

A first embodiment of the invention is given in FIG. 1. Oxygen-containing gas **1**, preferably air, is compressed in compressor **101** to a pressure between 50 and 500 psia, preferably 80 to 300 psia. Compressor **101** is a centrifugal, axial, or reciprocal compressor, optionally multistaged, and optionally intercooled. When operating without intercooling in an adiabatic mode, **compressed feed 3 will be at a temperature of 360 ° to 1,100 ° F.**; when operated with intercooling in an isothermal mode, compressed feed **3** will be at 150 ° to 300 ° F. Compressed feed is optionally preheated in heat exchange zone **103** by indirect heat exchange with hot process stream **5** (later defined) and heated stream **7** passes into direct-fired burner **105. This burner is a combustor, for example the type known and used in the gas turbine art, is preferably gas-fired, and utilizes fuel gas 9 which is natural gas, synthesis gas comprising hydrogen and carbon monoxide, refinery fuel gas containing mixed hydrocarbons, or another combustible gas mixture.** Burner 105 is operated with sufficient excess air such that hot combustion stream **11** contains about 10-20 vol % oxygen at a temperature of 800 ° to 2,000 ° F., preferably 1,000 ° to 1,600 ° F. **Stream 11 passes through the feed side of membrane separation zone 107 comprising membrane 108**, preferably a mixed conductor membrane, wherein oxygen diffuses through the membrane driven by an oxygen partial pressure differential in the range of 2 to 80 psi, and high purity oxygen stream **13** containing at least 98 vol % oxygen is withdrawn therefrom at 2 to 30 psia. Hot non-permeate stream **15** is withdrawn at near feed pressure and contains 6 to 18 vol % oxygen. Membrane **108** operates in the temperature range of **800 ° to 2,000 ° F, preferably 1,000 ° to 1,600 ° F**. Membrane separation zone **107** typically is sized and operated such that up to about 90% of the oxygen in membrane feed **11** is recovered as product **13**. (Emphasis added)

Applicant obtained an electronic version of Kang et al from uspto.gov and performed a word search within Kang et al for the word "hydrogen"; hydrogen only occurs within Kang et al as a component within a carbonaceous fuel.

In conclusion, Kang et al. does not teach or suggest the combustion of hydrogen, while Tindell does not teach or suggest the use of a membrane or of a heated membrane (which is not taught or claimed in the instant invention); therefore, there is no motivation between Kang et al.

and Tindell to combine with the other, e.g. MPEP 706.02(j). This is while both Tindell and Kang et al have teachings and/or requirements which are not found within the instant claim, e.g. heating a membrane, solar and voltaics.

As Applicant has respectfully traversed the Examiner's rejection of claims 230 - 236, Applicant respectfully requests an allowance of claims 230 - 236.

Examiner Rejection

Claim 237 is rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. 4841731 (Tindell) in view of U.S. 4440545 (Weidig). Tindell discloses all the claimed subject matter as set forth above, but does not disclose the use of corrosion inhibitor. Weidig is relied upon to disclose it's well known to use corrosion inhibitor in a combustion chamber. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to use corrosion inhibitor in Tindell as taught by Weidig for the purpose of inhibiting corrosion in the combustion chamber.

In response, Applicant would like to present to the Examiner, as presented above, that Tindell requires the use of solar energy, a voltaic cell and a steam generator, neither of which is required by claim 237. In addition, Applicant would like to present to the Examiner that Weidig teaches the use of a corrosion inhibitor for use in hydrocarbon fuels comprising ethanol. Specifically, in the abstract Weidig states:

> "Liquid fuels for use in internal combustion engines comprising (i) a major fraction of hydrocarbons boiling in the gasoline boiling range, (ii) a minor amount of ethanol, and (iii) a corrosion inhibiting amount of a hydrocarbyl succinic acid or anhydride having from about 8 to 30 carbon atoms."

Also, in the "Description of the Prior Art", Weidig states:

> "Thus, there is presently a need for a corrosion inhibitor that will either curb or prevent the corrosion of conventional systems which are used to store and transport commercial ethanol in gasoline fuel blends and one that will curb or prevent corrosion of the vehicle fuel systems in which these fuels are ultimately used. Further, it is important that the corrosion inhibitor be effective in very small quantities to avoid any adverse effects, such as adding to the gum component of the fuel, etc., as well as to minimize cost. The corrosion inhibitors of the present invention satisfy these needs."

> "U.S. Pat. No. 4,148,605 discloses novel dicarboxylic ester-acids resulting from the condensation of an alkenylsuccinic anhydride with an aliphatic hydroxy acid having from 2 to about 18 carbon atoms and amine salts of said ester-acid as rust or corrosion inhibitors in organic compositions."

> "U.S. Pat. No. 4,214,876 discloses improved corrosion inhibitor compositions for hydrocarbon fuels consisting of mixtures of (a) about 75 to 95 weight percent of a polymerized unsaturated aliphatic monocarboxylic acid having about 16 to 18 carbons, and (b) about 5 to 25 weight percent of a monoalkenyl-succinic acid wherein the alkenyl group has 8 to 18 carbons. Also described are concentrates of the above compositions in hydrocarbon solvents, as well as fuels containing the compositions."

And, within the "Summary of the Invention", Weidig states:

> "This invention is a fuel comprising a major amount of gasoline, a minor amount of ethanol and a corrosion inhibiting amount of a hydrocarbyl succinic acid or anhydride having from about 8 to 30 carbon atoms."

And, within Example 1 located in the "Description of Preferred Embodiments" Weidig states:

> "The results summarized in Table I demonstrate that the **anti-rust compositions of the present invention are effective corrosion inhibitors in the ethanol-gasoline fuel mixtures** at very low concentrations. The results show that those metals and metal alloys exposed to fuels containing a corrosion inhibitor composition of the present invention exhibited a significant reduction in weight loss when compared to like metals and metal alloys exposed to the same fuel blends containing no corrosion inhibitor." (Emphasis added)

Further, Applicant obtained an electronic version of Weidig from uspto.gov and performed a word search within Weidig for the word "hydrogen"; hydrogen does not appear within Weidig except as a description of the ethanol molecule; there is no description within Weidig for a hydrogen engine. Applicant also performed a word search within Tindell for the word "corrosion"; the word corrosion does not appear within Tindell, nor does the word inhibitor.

In conclusion, Weidig does not teach or suggest the combustion of hydrogen, while Tindell does not teach or suggest corrosion or the use of a corrosion inhibitor; therefore, there is no motivation between Weidig and Tindell to combine with the other, e.g. MPEP 706.02(j). This is while both Tindell and Weidig have teachings and/or requirements which are not found within the instant claim, e.g. solar energy and voltaics.

As Applicant has respectfully traversed the Examiner's rejection of claim 237, Applicant respectfully requests an allowance of claims 237.

Examiner Rejection

Claim 241 is rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. 4841731 (Tindell) in view of U.S. 3975913 (Erickson). Tindell discloses all the claimed subject matter as set forth above, but does not disclose the use of fuel cell. Erickson is relied upon to disclose it's well known to use fuel cell **1** to work in combination with an electrolysis chamber. It would

have been obvious at the time the invention was made to a person having ordinary skill in the art to use fuel cell in Tindell as taught by Erickson for the purpose of generating the appropriate amount of hydrogen and oxygen.

In response, Applicant would like to present to the Examiner, as presented above, that Tindell requires the use of solar energy, a voltaic cell and a steam generator, neither of which is required by claim 241. In addition, Applicant would like to present to the Examiner that Erickson teaches a gas generator to power a fuel cell. Specifically, in the abstract Erickson states:

> "A gas generator is disclosed which will simply and reliably effect a gas producing reaction between a gaseous and a liquid reactant. The generator can operate at elevated temperatures and has heat exchange means incorporated. The gas generator is applied as a hydrogen generator to an energy conversion system in which hydrogen from the hydrogen-producing reaction powers a fuel cell and the reaction heat from the hydrogen producing reaction powers a thermal engine, thereby enhancing the energy conversion system relative to one in which the hydrogen generator is merely cooled and its heat is rejected as waste heat. Other possible energy conversion systems based on this gas generator are disclosed."

And, in the "Description of the Preferred Embodiments" Erickson states:

> "The basic concept of the gas generator is applicable to the chemical generation of a wide variety of gases, using an even wider variety of chemical reactants. The only stipulation is that at the pressure and temperature of operation (i.e., the bulk temperature of the mass of reactants contained in the generator vessel while the gas generating reaction is occurring) one of the reactants be in the liquid state and one reactant be in the gaseous state. Since the temperature of operation can be anywhere from below ambient to very much above ambient, e.g., 2000.degree.F or even higher, many gas-producing reactants which do not meet the above stipulation at ambient temperature will be in the desired state at some elevated temperature.
>
> "As an example of the above, when the gas generator design is employed as a hydrogen gas generator, the liquid reactant used in the preferred embodiment is a molten metal. The preferred metals for this application are lithium, aluminum, sodium, potassium, magnesium, and calcium, plus the compound lithium hydride. Any of these can be used individually or in any combination with any of the others. Silicon and beryllium also have the desired properties of displacing hydrogen from steam and having a high energy release per unit weight, but their melting point is too high to be used individually. However, they can be combined with the fuels listed above such that the resulting alloy has a sufficiently low melting point."

Further, Applicant obtained an electronic version of Erickson from uspto.gov and performed a word search within Erickson for the words "liquefaction" and "cooling"; neither "liquefaction" or "cooling" appear within Erickson; therefore, there is no description within Erickson to use a fuel cell to liquefy or cool hydrogen and/or oxygen as presented in instant claim 241. Applicant also performed a word search within Tindell for the words "liquefaction" and "cooling"; these words are not within Tindell. In fact, Tindell teaches pressure storage of hydrogen and of oxygen and discussed above. Claims 216, 239, 240 and 241 state:

"216. An engine comprising a fuel mixture of oxygen, as O_2, and hydrogen, as H_2, wherein

said oxygen and hydrogen are combusted in a combustion chamber, and wherein

the temperature of said combustion or of said combustion chamber is at least partially controlled with the addition of water to said combustion chamber.

239. (Previously Presented) The engine of claim 216, wherein at least one of oxygen and hydrogen is stored in at least one of a cooled gas state and a liquid state by liquefaction.

240. (Previously Presented) The engine of claim 239, wherein compressor(s) for at least one of cooling and liquefaction is powered by at least one of said engine and a fuel cell.

241. (Previously Presented) The engine of claim 240, wherein said fuel cell is powered by hydrogen and at least one of oxygen and air."

In conclusion, neither Tindell or Erickson teach or suggest the liquefaction or the cooling of hydrogen or of oxygen, much less the use of a fuel cell to perform said liquefaction or cooling; therefore, the combination of Tindell and Erickson do not teach claim 241, much less combine in a way that teaches or suggests claim 241. This is while both Tindell and Weidig have teachings and/or requirements which are not found within the instant claim, e.g. solar energy, voltaics and a gas generator.

As Applicant has respectfully traversed the Examiner's rejection of claim 241, Applicant respectfully requests an allowance of claim 241.

Examiner Rejection

Claims 242, 259-260, are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. 4841731 (Tindell). Tindell discloses all the claimed subject matter as set forth above, but does not disclose the use of gel storage and jet propulsion rocket. However, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to use gel storage and jet propulsion rocket in Tindell for the purpose of ease of storing gases and driving rocket if needed (note it is well known to use combustion engine such as gas engine to produce thrust in aircraft/rocket design).

In response, Applicant would like to present to the Examiner, as presented above, that Tindell requires the use of solar energy, a voltaic cell and a steam generator, neither of which is required by claim 216 or by claims 242, 259 - 260. In addition, Applicant would like to present to the Examiner that while Applicant is aware of hydrocarbon gels, Applicant has not located any

publication or patent that teaches the formation of a hydrogen or of an oxygen gel with water crystals. In strong contrast to the Examiner's assertion, Applicant would like to present to the Examiner the many efforts to date by others investigating metal hydride storage of hydrogen, wherein it is well known by those of ordinary skill in the art that hydrogen storage is a challenge to the hydrogen economy. Please refer to the declaration of Applicant attached. Should the Examiner have ANY published information which would rebut or question the information within the attached declaration, Applicant herein requests that the Examiner please put forth said published information.

In further response, Applicant refers the Examiner to page 47 line 22 through page 50 line 14, wherein Applicant in the instant invention has performed an energy balance around a jet engine incorporating the "thrust" equation of jet propulsion. Therein Applicant has presented his discovery of a thermodynamic imbalance of a jet engine operating with a hydrogen fuel which previously operated with kerosene; Applicant has discovered that for a jet engine to operate with hydrogen as a fuel while providing an about equivalent amount of thrust and combustion temperature that an increase in air is required to maintain thrust and operating temperature, as compared to a kerosene engine. This is while there have been many previous research attempts to develop a hydrogen jet engine, wherein a lack of thrust and a high combustion temperature have always proven to be issues. Please refer to the attached declaration of Applicant. As stated above, should the Examiner have ANY published information which would rebut or question the information within the attached declaration, Applicant herein requests that the Examiner please put forth said published information.

And still in further response, Applicant would like to present to the Examiner that Applicant has located no published reference wherein hydrogen, oxygen and water are used in a three component combustion rocket application. Applicant readily presents to the Examiner that it is well known to power a rocket engine with hydrogen and with oxygen; however, Applicant has located no teachings as to the use of hydrogen/oxygen/water as the combustion mixture in a rocket engine. To that end, Applicant would like to direct the Examiner to page 49 lines 8 through 24 of the instant invention specification. Also, please refer to the attached declaration of Applicant. As stated above, should the Examiner have ANY published information which would rebut or question the information within the attached declaration, Applicant herein requests that the Examiner please put forth said published information.

Lastly, Applicant would like to present to the Examiner that Tindell has no teachings as to the formation of a hydrogen gel, jet propulsion or rocket propulsion. Applicant performed another

word search within Tindell for "gel", "propulsion", "jet" and "rocket"; these words do not even appear in Tindell.

Applicant refers the Examiner to MPEP Section 706.

As Applicant has respectfully traversed the Examiner's rejection of claims 242, 259 and 260, Applicant respectfully requests an allowance of claims 242, 259 and 260.

Examiner Rejection

Claims 244-247 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. 4841731 (Tindell) in view of U.S. 6698183 (Thordarson). Tindell discloses all the claimed subject matter as set forth above, but does not disclose the use of flywheel and transmission. Thordarson is relied upon to disclose it's well known to use flywheel 176 and transmission 178 for transmitting power from a combustion chamber/engine 22. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to use flywheel and transmission in Tindell as taught by Thordarson for the purpose of transmitting power output of the combustion engine.

In response, Applicant would like to respectfully present to the Examiner that: claims 244-247 depend upon claim 216. As Applicant has respectfully traversed the Examiner's rejection of claim 216, Applicant has respectfully traversed the Examiner's rejections of claims 244–247 by traversing the base claim upon which claims 244–247 depend. Accordingly, Applicant respectfully requests an allowance of claims 244–247 as amended herein according to MPEP 2143.03.

CONCLUSION

In view of the foregoing, Applicant believes that the claims as presently amended, are in order for allowance, and respectfully request favorable reconsideration of this response and amendment, and allowance of the claims at the earliest opportunity.

Respectfully submitted,

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